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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF SECRETARY

BY HAND DELIVERY

William F. Caton
Acting Secretary
Federal Communications Commission
1919 M Street, N.W., Room 222
Washington, D.C. 20554

Re: **Ex Parte Presentation In the Matter of Advanced Television Systems
and Their Impact Upon the Existing Television Broadcast Service-
MM Docket No. 87-268**

Dear Mr. Caton:

On Monday, January 22, 1996, Jay Torborg, Director of Graphics and Multimedia for Microsoft, Alva Ray Smith, a Graphics Fellow at Microsoft, and I met with Commission staff to discuss advanced television issues. Attending that meeting from the Commission were Donald Gips, Florence Setzer, and Mark Corbitt of the Office of Plans and Policy; Joseph Farrell, the Commission's Chief Economist; Bruce Franca, Robert Bromery, and Allen Stillwell of the Office of Engineering and Technology; Bill Johnson of the Cable Services Bureau; and Steven Selwin of the International Bureau.

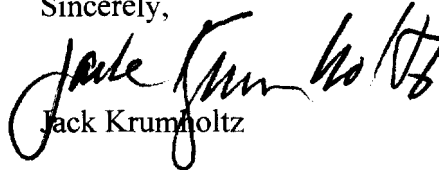
Specifically, we discussed the various technical issues associated with advanced or digital television and the computer industry's interest in ensuring full convergence of the television and personal computer platforms. To facilitate that discussion, we relied on a series of overhead slides and provided Commission staff with hard copies of those slides. An original and one copy are attached.

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If you have any questions or need any additional information please feel free to contact me at (202) 895-2169.

Sincerely,



Jack Krumholz

Enclosures

cc: Donald Gips, Office of Plans and Policy
Florence Setzer, Office of Plans and Policy
Mark Corbitt, Office of Plans and Policy
Joseph Farrell, Office of Plans and Policy
Bill Johnson, Cable Services Bureau
Steven Selwin, International Bureau
Bruce Franca, Office of Engineering and Technology
Robert Bromery, Office of Engineering and Technology
Allen Stillwell, Office of Engineering and Technology

Advanced Television

THE CONVERGENCE OF PERSONAL COMPUTERS & TELEVISION

Jay Torborg

Director, Graphics and Multimedia

Alvy Ray Smith

Graphics Fellow

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Advanced Television

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COMPUTER INDUSTRY INTEREST

❖ Late comer to ATV process

PC performance has increased 50 to 100 times since
ACATS formed

PC growth in US consumer market dramatic in past 3
yrs.

PCs only now capable of handling high quality video

❖ Interactive programming

Internet grown faster than anyone's expectations

Information bandwidth most significant impediment to
even greater growth

MICROSOFT INTEREST

- ❖ Already working with cable, telco, and DBS market
- ❖ Enabling interactive content using PC technology
 - Interactive TV is a subset of PC
 - ITV technology evolving with PC technology
- ❖ Full convergence in the near term (non-terrestrial)
 - PC and TV functionality provided by common platform
 - Interoperability of consumer electronic devices with PCs - 1394, large screen hi-res monitors

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WHAT IS ADVANCED TV?

- ❖ Traditional view:
 - Digital broadcast technology to improve quality and quantity of linear video and audio material
- ❖ Microsoft's view:
 - New high bandwidth distribution medium for the broadcast of data
 - Allows wide spread availability of rich content
 - Content can be linear and interactive video, audio, 2D and 3D graphics, text, programs, and other data

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DEMONSTRATION

- ❖ Mock-up of broadcast which combines conventional television elements and interactive elements
- ❖ Originally designed for SVGA progressive scan computer display

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INTEROPERABILITY

- ❖ PC controls display of video on TV monitor
Typical of PC based video editing, kiosks, multimedia
- ❖ TV video displayed in window on PC monitor
Common with multimedia titles; live broadcast video supported on PCs with additional hardware
- ❖ TV and PC programs *share data* - true interoperability, possible now
Working prototypes at Microsoft
Complete high-end consumer PC, DBS receiver, 32 inch progressive scan display - will sell for well under \$3000

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WHY CONVERGENCE?

- ❖ Leverage U.S. industry dominance in software
 - Provide new market opportunities for the distribution of content created by U.S. companies
- ❖ Provide opportunity for U.S. companies to enter consumer electronics market space
- ❖ Make television more engaging
 - Educational as well as entertaining - less of a passive experience

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OUR PROPOSAL

- ❖ Advanced TV is an information carrier
- ❖ Government should regulate data transport
 - Spectrum allocation, modulation standards, network protocols
- ❖ Industry should control content
 - Data protocols, compression technology, display formats

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ACATS

- ❖ Proven that advanced digital television is feasible
- ❖ Valuable experiments to determine best modulation scheme and error correction protocol
- ❖ Propose a fixed standard
 - All formats defined
 - Only what we know how to easily do today

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ACATS PROPOSED STANDARD

	}	Recommend no government regulation
		Recommend IP on ATM
	}	Recommend ACATS proposed approach be approved

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COMPUTER INDUSTRY CONCERNS

- ❖ Focused on specific video compatibility issues
- ❖ ACATS has proposed standard video formats
 - None are optimal for computers
 - All formats must be supported by receiver - too many formats
 - High quality format conversion not practical
- ❖ No room for improvements as technology becomes available

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DIGITAL PROGRESS

- ❖ Performance at least doubling every 1.5 years, quadrupling every 3 years
- ❖ Since ACATS committee formed, PCs have increased in every way, but cost, by over 50x
 - At constant cost to user, 50x more memory, 50x faster
- ❖ 8 years from now, another factor of 50x (2500x since 1987!)

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PREDICTIONS

- ❖ 10x is difficult to predict; 1000x is almost impossible
- ❖ Since 1987, simple sound and pictures have become possible on PCs
- ❖ By ~2003, can *compute* video in real-time!
- ❖ Mistake to define/constrain a digital process (e.g., communication) by today's understanding

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CASE IN POINT

- ❖ The Internet: Minimal specification (transport protocol) many years ago
- ❖ Thousands of businesses have utilized the spec
20 yr. ago we had no idea of Netscape, World Wide Web, MSN, AOL, etc.
- ❖ Internet has evolved with the technology
Easily accessible by millions of consumers
- ❖ Lesson for the digital spectrum: minimal specification makes sense

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INTERNET MODEL

- ❖ Digital TV can be extension of Internet
- ❖ As with the Internet, specify the transport, not the type of data
- ❖ TV becomes one application/user of this system
 - The TV industry further specifies the national standard for linear media data protocols
 - But does not affect how other industries choose to use
- ❖ Consumers decide what uses of the new system are interesting

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TRANSPORT PROTOCOL

- ❖ ACATS proposes MPEG transport
 - Well suited for MPEG content, not ideal for other content
 - Doesn't leverage industry standard networking technology
 - Low volumes for switches and routers will result in significant cost premium for equipment
 - Channel spectrum allocated up front - cannot be dynamically adjusted

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TRANSPORT PROTOCOL

❖ **Recommend Internet Protocol using ATM transport**

General purpose - provides interoperability with existing computer standards

Can support MPEG data protocols, as well as other applications

Industry standard - leverages cost effective technology

Dynamic bandwidth allocation - provides better use of available spectrum

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DISPLAY FORMATS

❖ **Everyone agrees that 70+ Hz progressive scan would be optimal**

❖ **Not yet feasible at HDTV resolution within 6 Mhz channel**

❖ **ACATS solution:**

Define many different formats, all of which are practical today, to address different kinds of content

Pass the cost of format conversion to the consumer

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NO CONVERGENCE

- ❖ All ACATS formats optimized for linear motion video
 - None are well suited to PC multimedia or Internet content
- ❖ Digital TVs will have to be optimized for passive TV video as defined by these formats
- ❖ No hope of convergence

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NON-TERRESTRIAL BROADCAST

- ❖ Other broadcast industries (cable, etc.) will not be hampered by the same restrictions
- ❖ Will evolve to leverage advancing technologies
- ❖ Over-regulated terrestrial broadcast industry will fall behind the technology curve
 - Will require government subsidies to remain competitive

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ENABLING TECHNOLOGIES

❖ **Internet**

Data protocols advancing constantly

Download support for new protocols to receiver

❖ **Media DSPs**

❖ **Dynamic regulation**

Match presentation to local processing capabilities

❖ **Compression technology**

Image segmentation, wavelet and fractal coding

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CONCLUSIONS

❖ **Digital TV offers tremendous opportunities to enable high bandwidth delivery of interesting content to the broadest population**

❖ **Digital technology changing at a rapid pace**

· FCC should limit regulations to enable leveraging of this technology

❖ **U.S. businesses poised to leverage convergence of digital TV and computers**

❖ **Consumers will benefit from more interesting content and easy migration to new technologies**

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